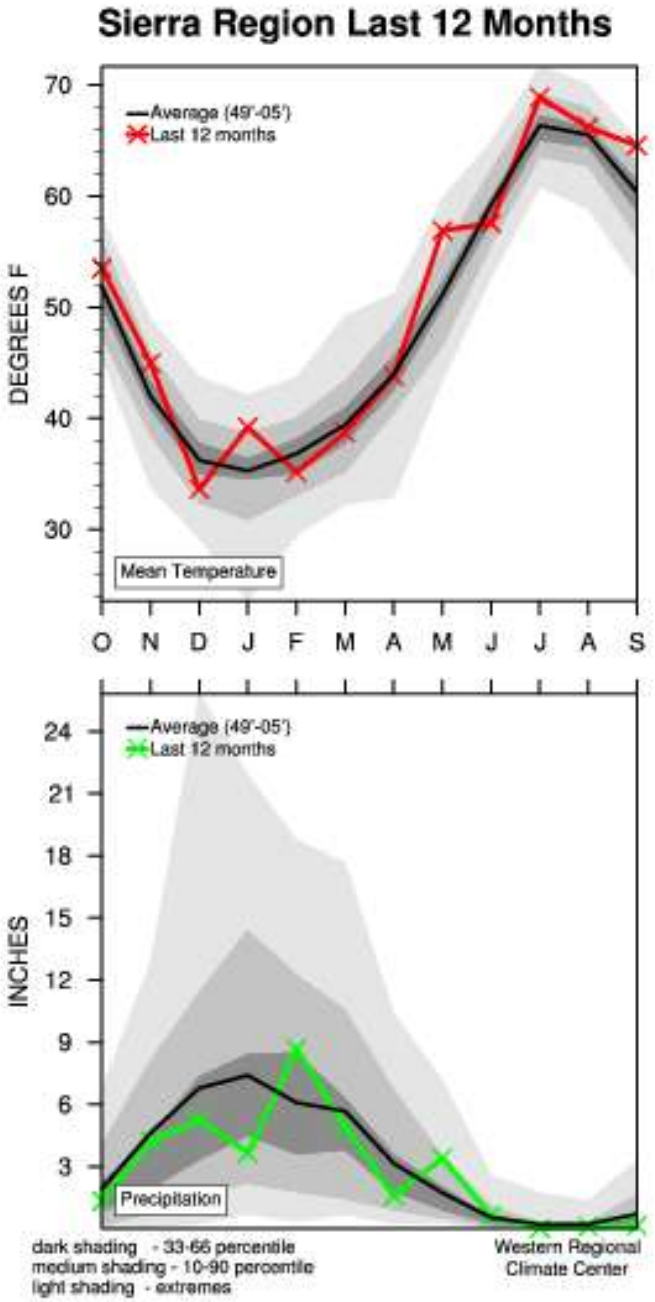
Water Years 2009 and 2010
Almost and What If?

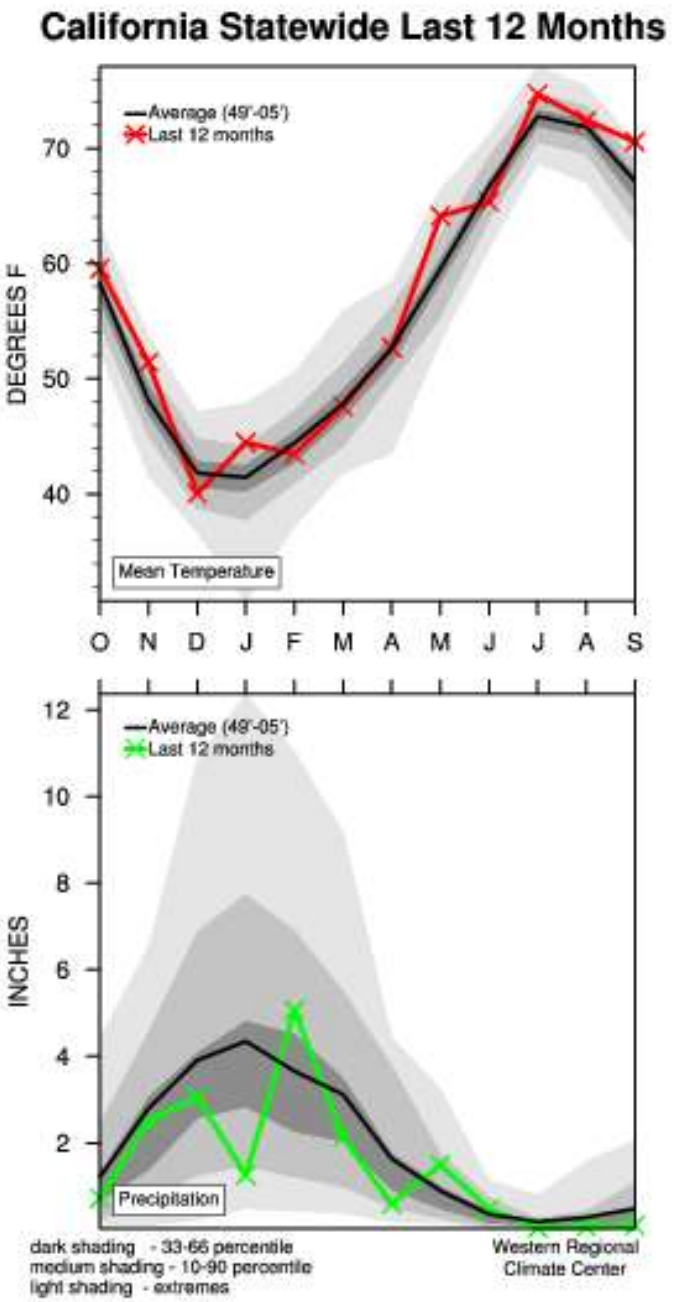
California Cooperative Snow Surveys Annual Meeting
October 27-29, 2009

Talk Overview

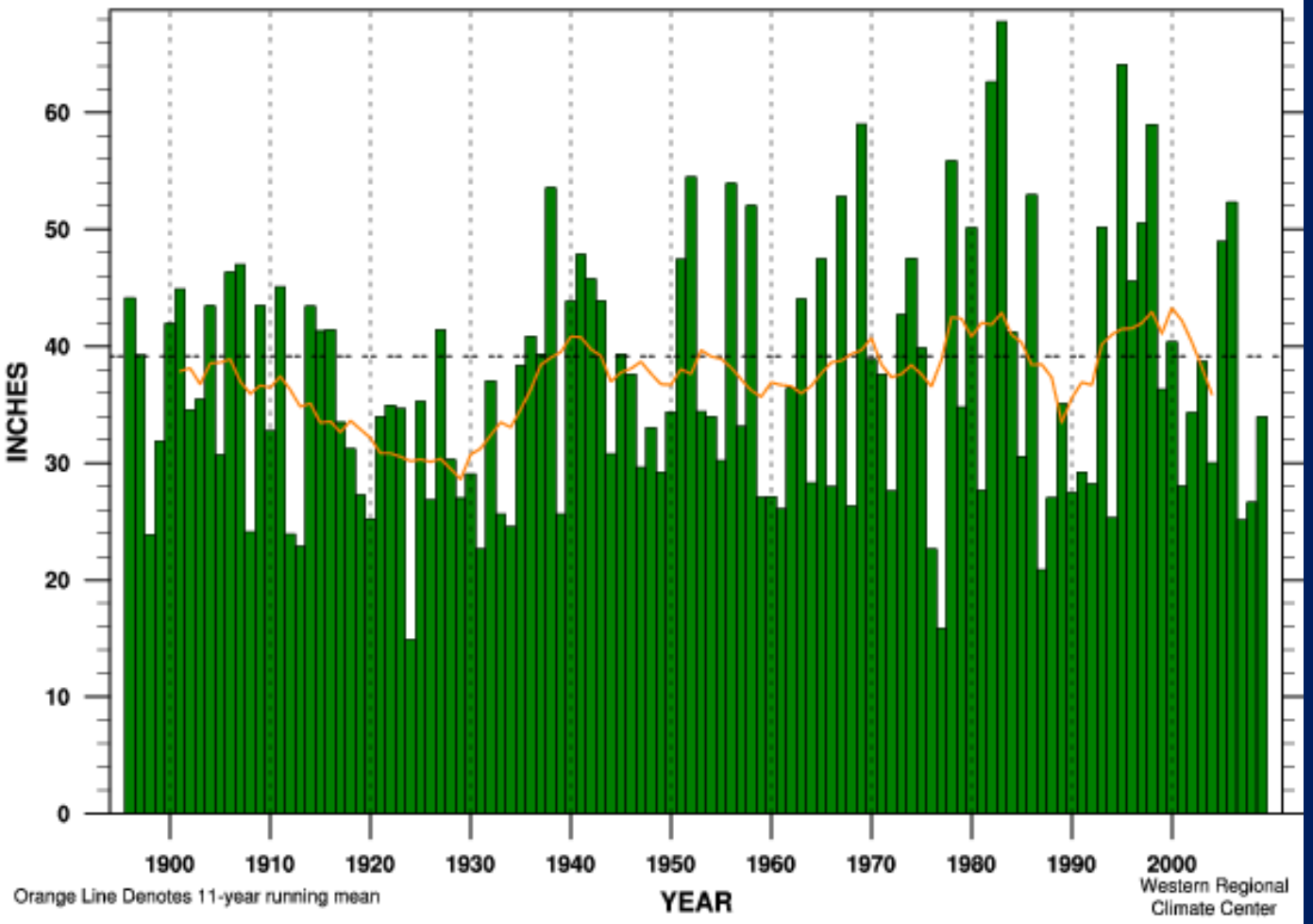
- WY-2009: Review
- WY-2010: Outlook
- State Climate Program

WY2009 California Climate Tracker





Sierra Region
Precipitation Oct-Sep



Linear Trend 1895-present	+ 4.52 ± 6.00 in.	(+ 11 ± 15%) per 100 yr	
Linear Trend 1949-present	- 0.56 ± 18.45 in.	(- 1 ± 47%) per 100 yr	
Linear Trend 1975-present	- 3.33 ± 49.60 in.	(- 8 ± 126%) per 100 yr	
Wettest Year	67.79 in. (173%)	in 1983	MEAN 39.15 in.
Driest Year	14.89 in. (38%)	in 1924	STDEV 12.33 in.
Oct-Sep 2009	34.00 in. (86%)		RANK 50 of 114

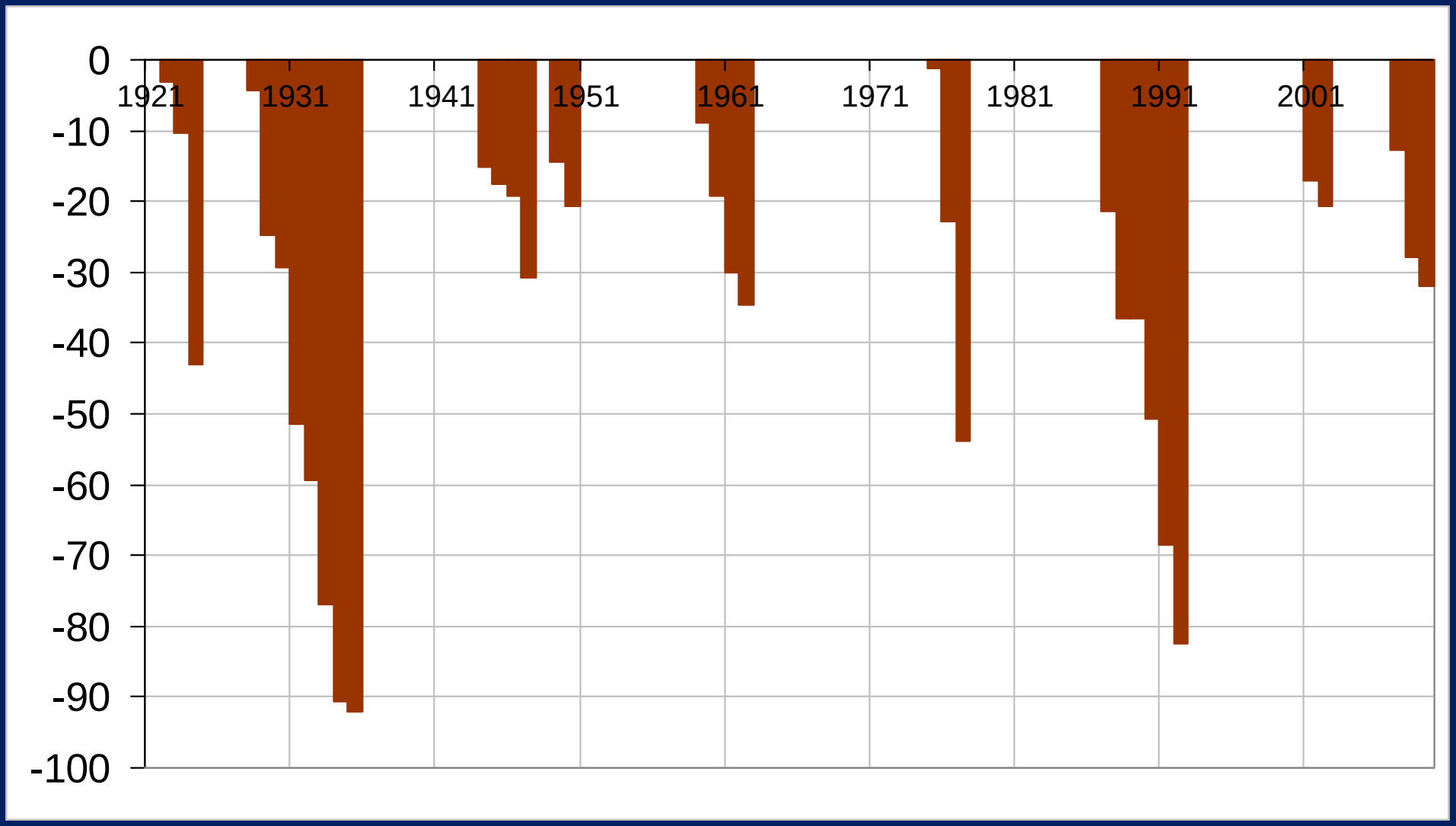
WY-2009 by the Numbers

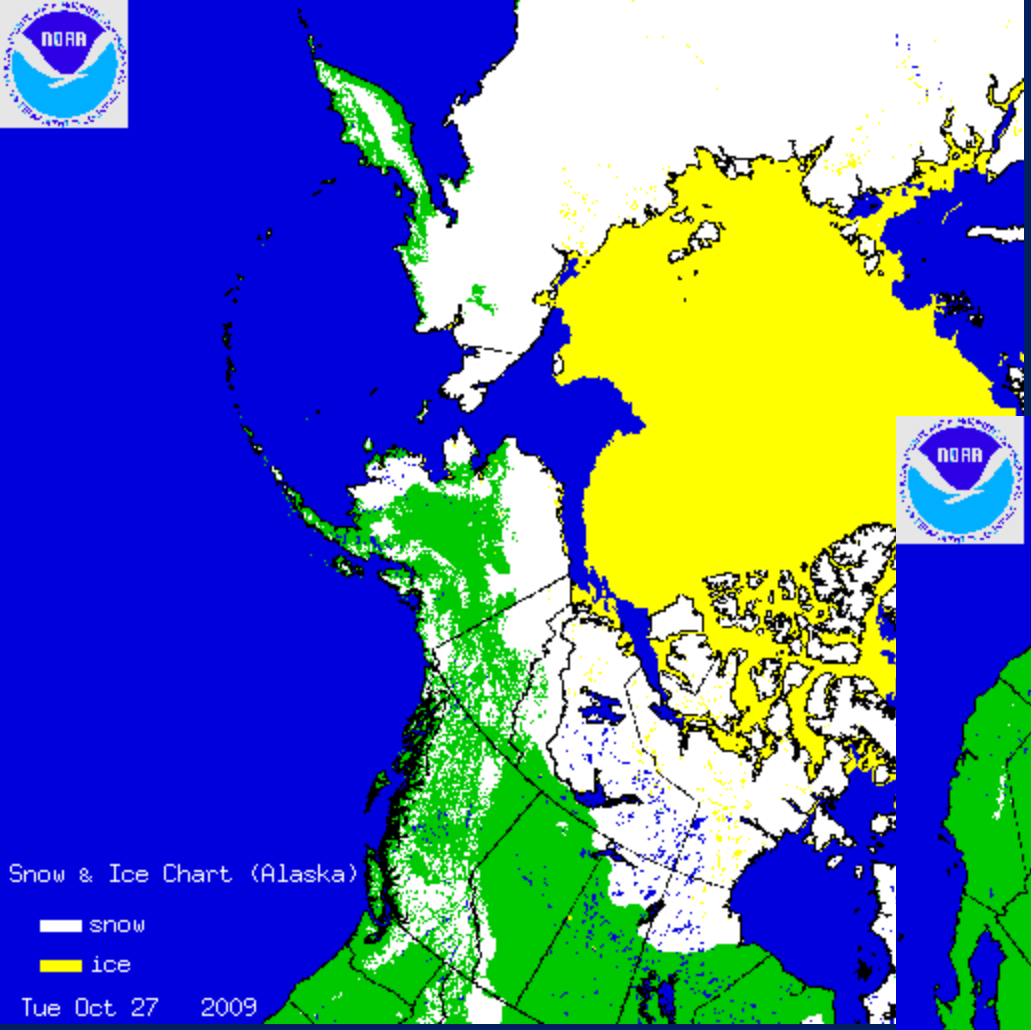
- 8 Station Index: 46.9 inches 93% of average
- 5 Station Index: 39.1 inches 96% of average

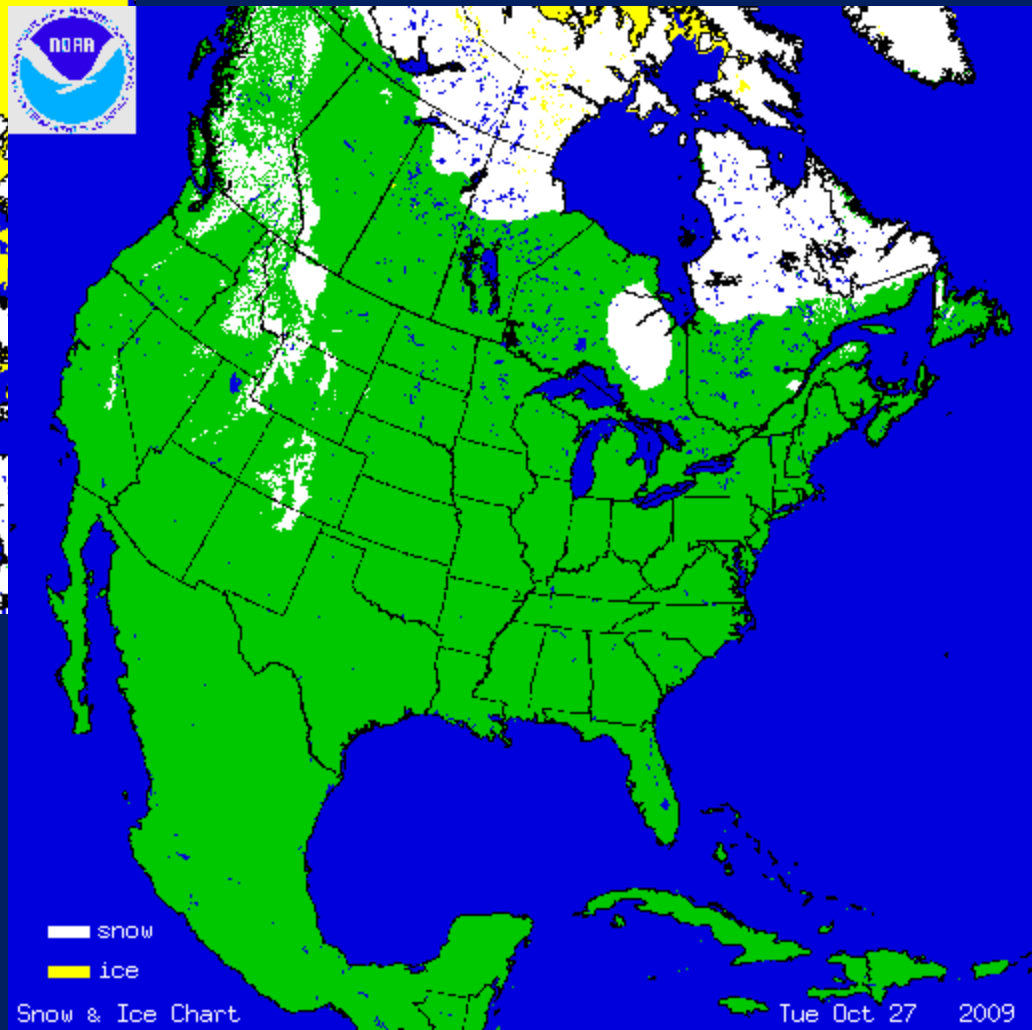
- Sacramento Runoff Index 40-30-30: 5.75 Dry
- San Joaquin Runoff Index 60-20-20: 2.73 BN

- Sacramento 4 River FNF: 12.91 MAF
- San Joaquin 4 River FNF: 4.97 MAF

20th Century CA Droughts – 8 Station Index Perspective

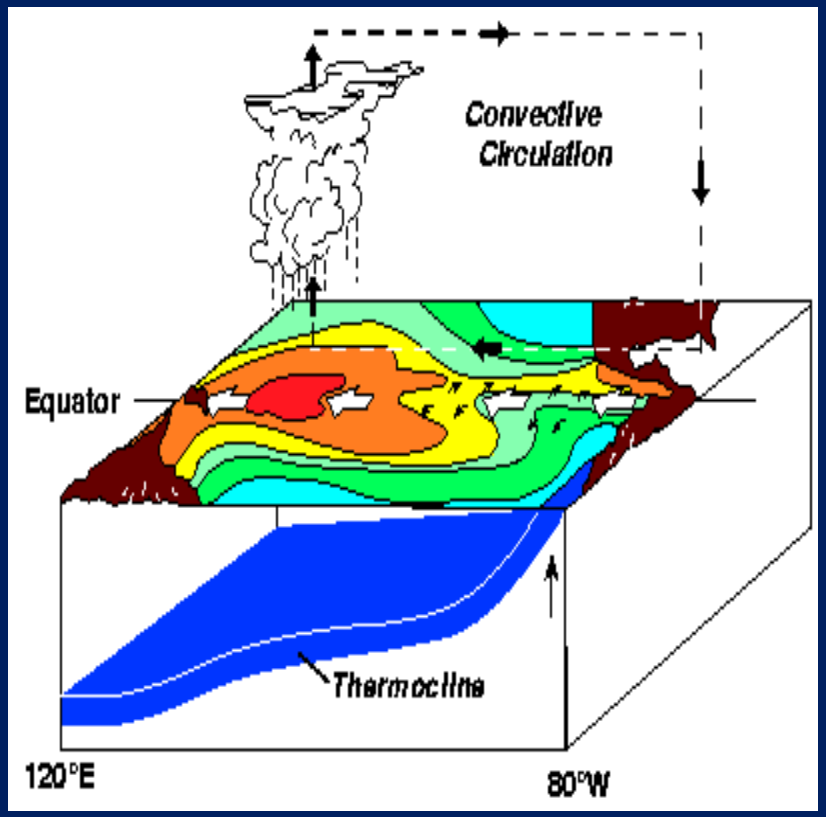



Snow & Ice Chart (Alaska)
snow
ice
Tue Oct 27 2009

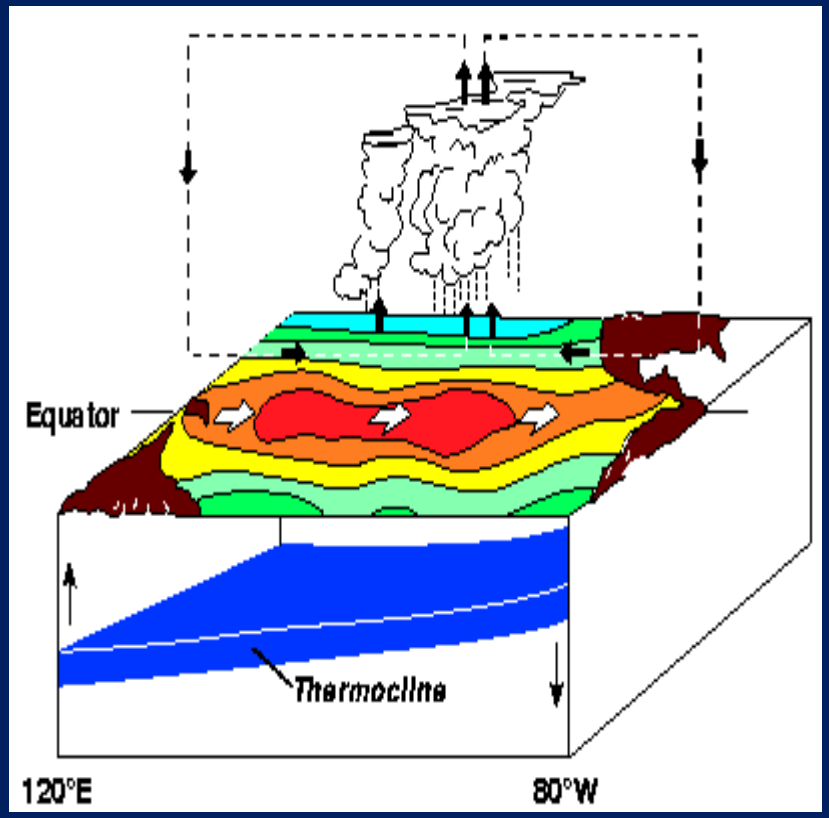

snow
ice
Snow & Ice Chart
Tue Oct 27 2009

WY-2010 El Niño???

NORMAL CONDITIONS



El Niño CONDITIONS



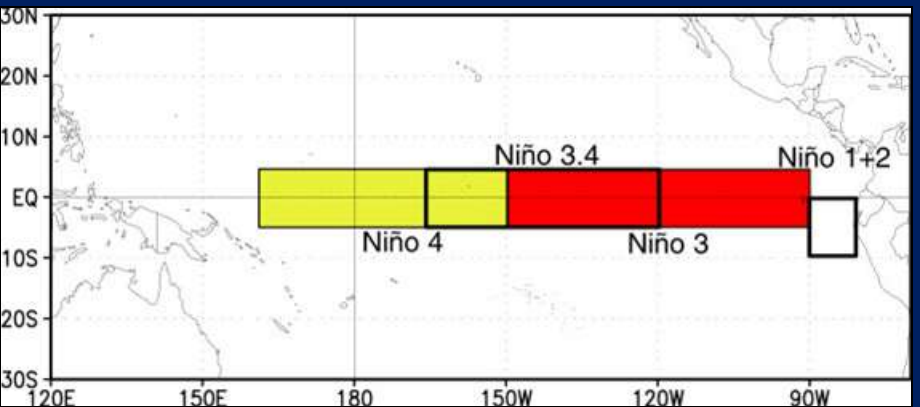
El Niño

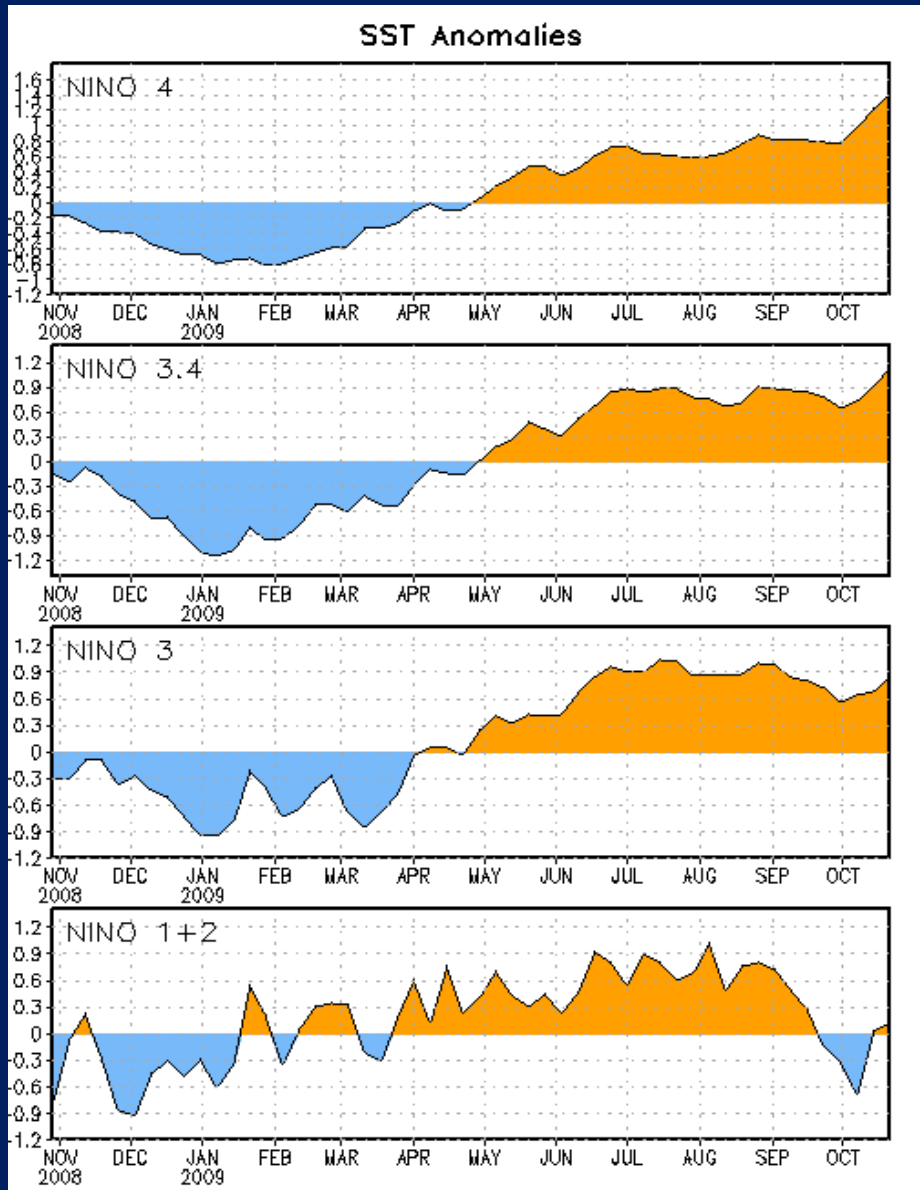
- All El Niños are different. They can vary in strength and location.
- The impacts of El Niño on central California's weather can vary significantly.
- El Niño does not actually create storms over California. It causes a shift in the weather pattern which makes some areas more susceptible to storm formation.

Niño Region SST Departures (ºC)
Recent Evolution 10/26/09

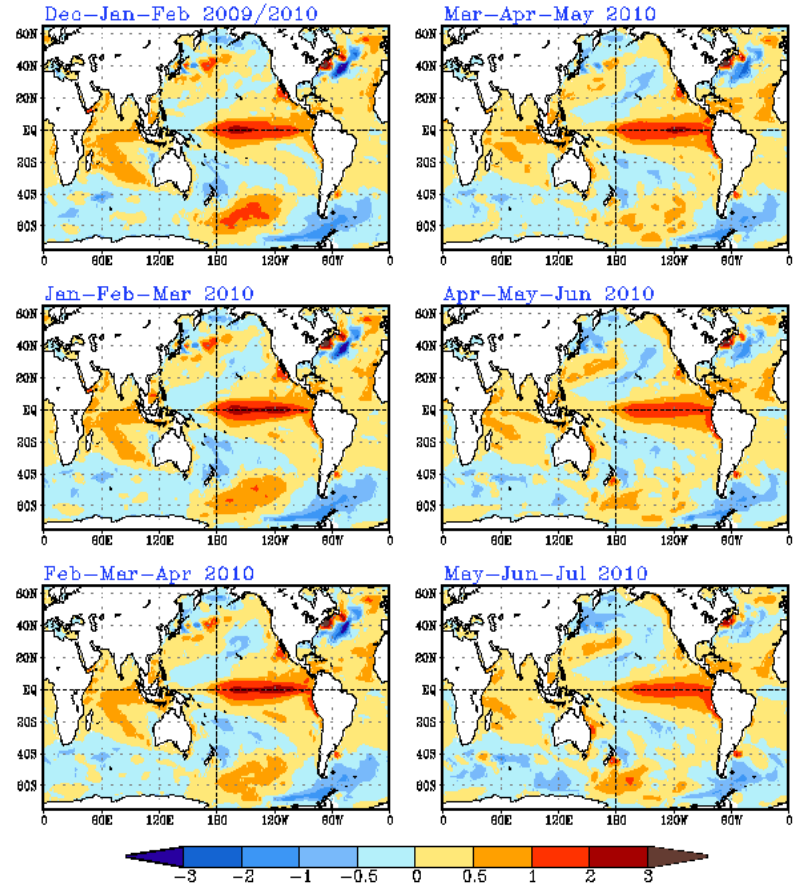
The latest weekly SST departures are:

Niño 4	**1.4ºC**
Niño 3.4	**1.1ºC**
Niño 3	**0.8ºC**
Niño 1+2	**0.1ºC**

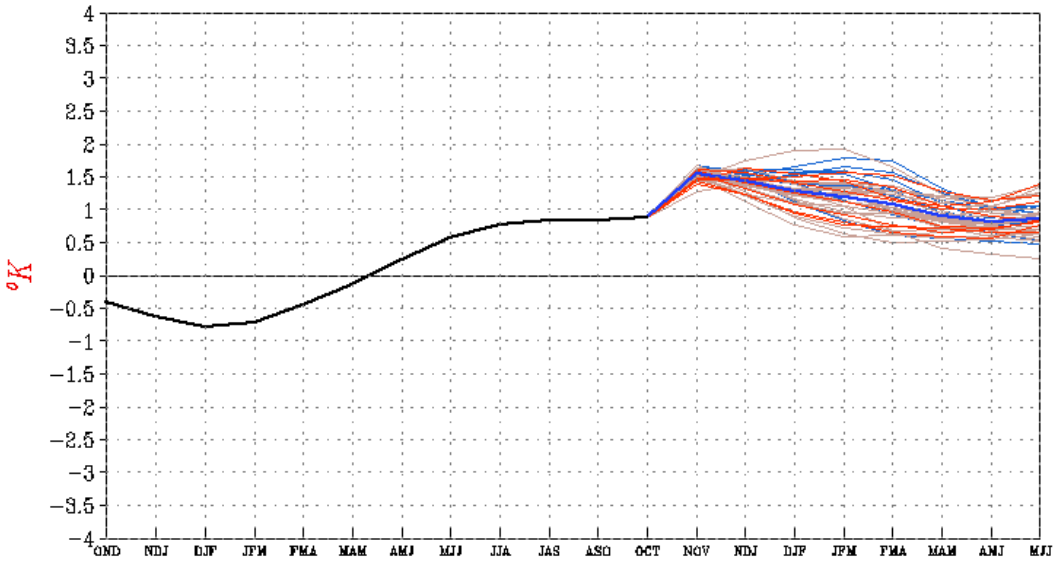




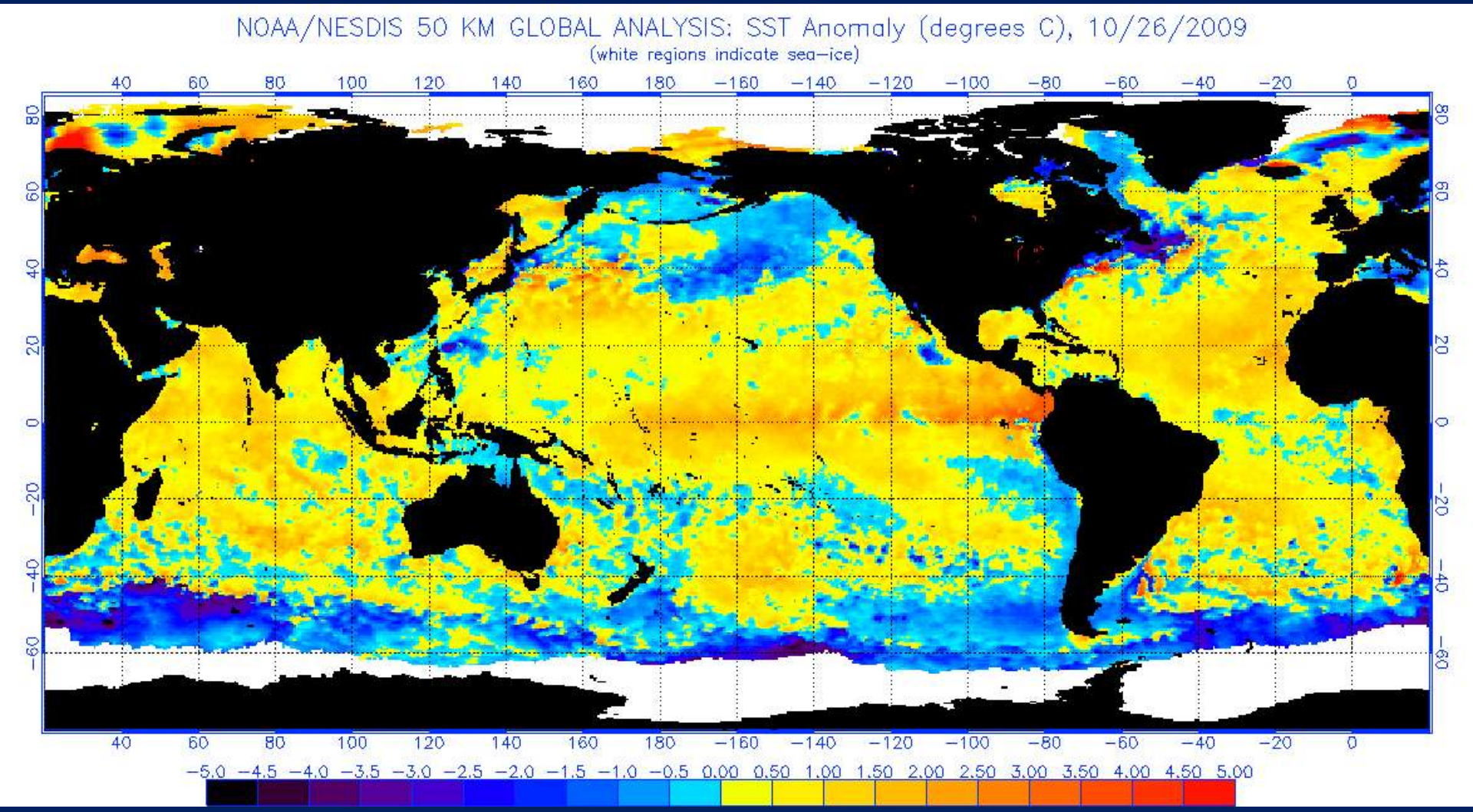
SST Outlook: NCEP CFS Forecast Issued 18 October 2009



The CFS ensemble mean (heavy blue line) predicts El Niño will last through Northern Hemisphere winter 2009-10.



Current state of the SST's



El Niño Climatology

- Of the 18 El Niño events since 1950, rainfall has been above normal ½ of the time and below normal ½ of the time in central California.

- The six strong El Niños: 4 of 6 had above normal rainfall (3 of which >140% of normal).

- Weak and moderate El Niños: 6 of 9 years had below normal rainfall in central California.

El Niño Climatology

- 1976-1977 drought was during a weak El Niño.
- Only 4 of 10 of the costliest floods in California occurred when there was an El Niño.
- ‘Pineapple connections’ and MJO’s more prevalent during non-El Niño years.
- El Niño is not the only thing happening in the atmosphere! Other oscillations and patterns can enhance or detract from overall impact.

What to watch for

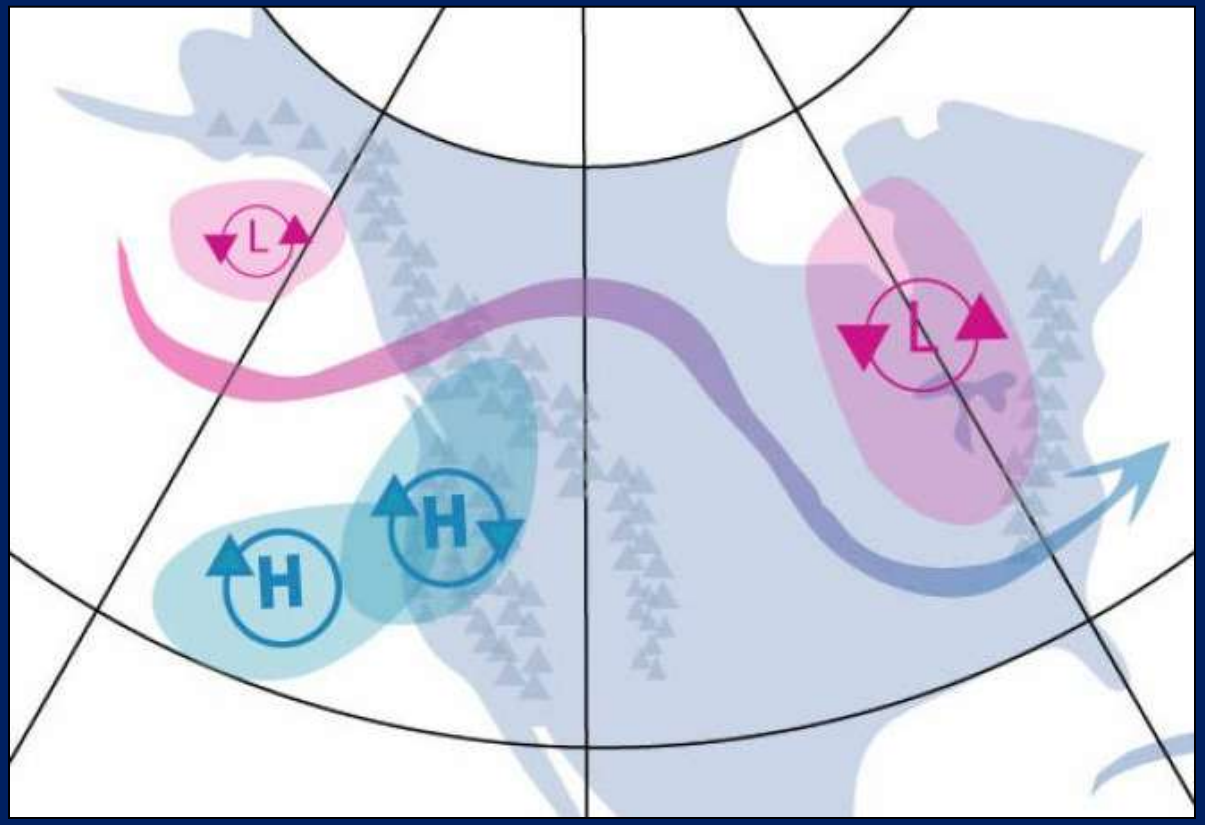
- North Atlantic Oscillation - A negative NAO can result in a strong ridge over the west coast.

- Madden Julian Oscillation - MJO’s tend to be quiet during El Niño global signals.

What to watch for – PNA

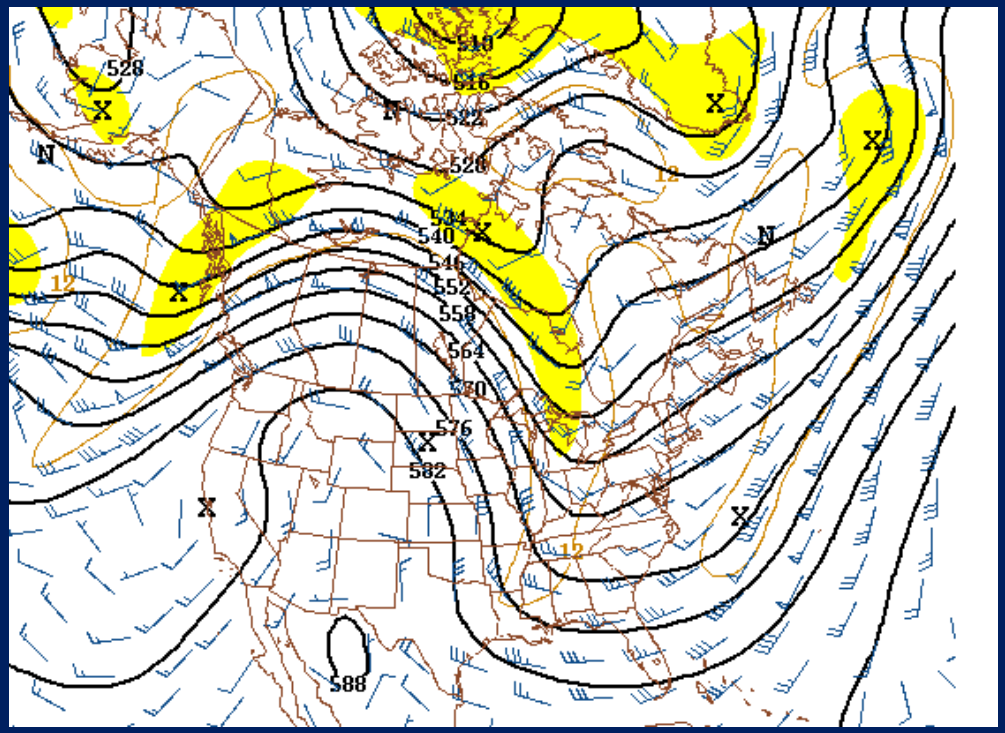
(Pacific - North American Pattern)

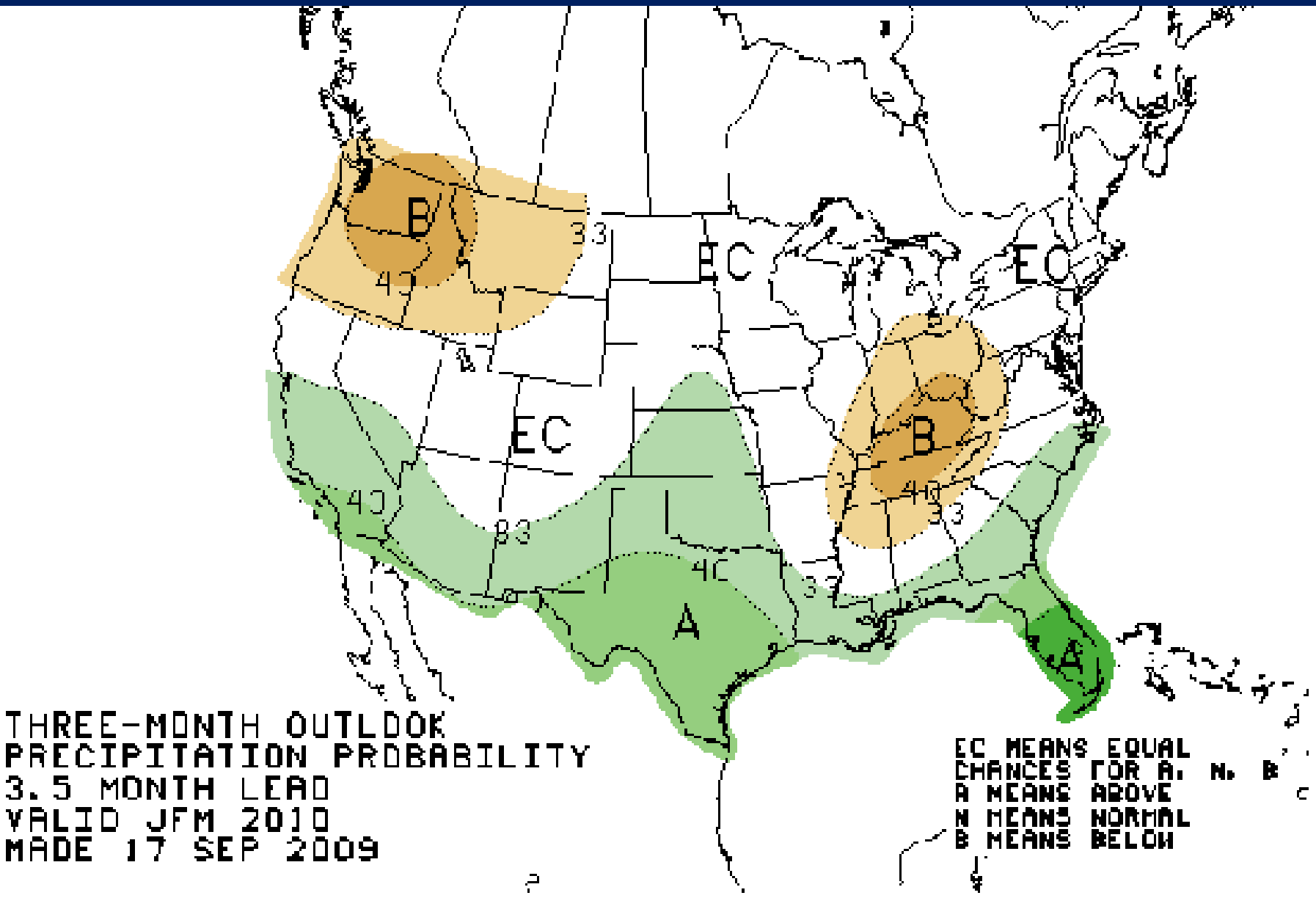
- Positive phase: The PNA+ pattern leads to drought conditions south of Mt Shasta on the West Coast.



What to watch for – 4 Corner High

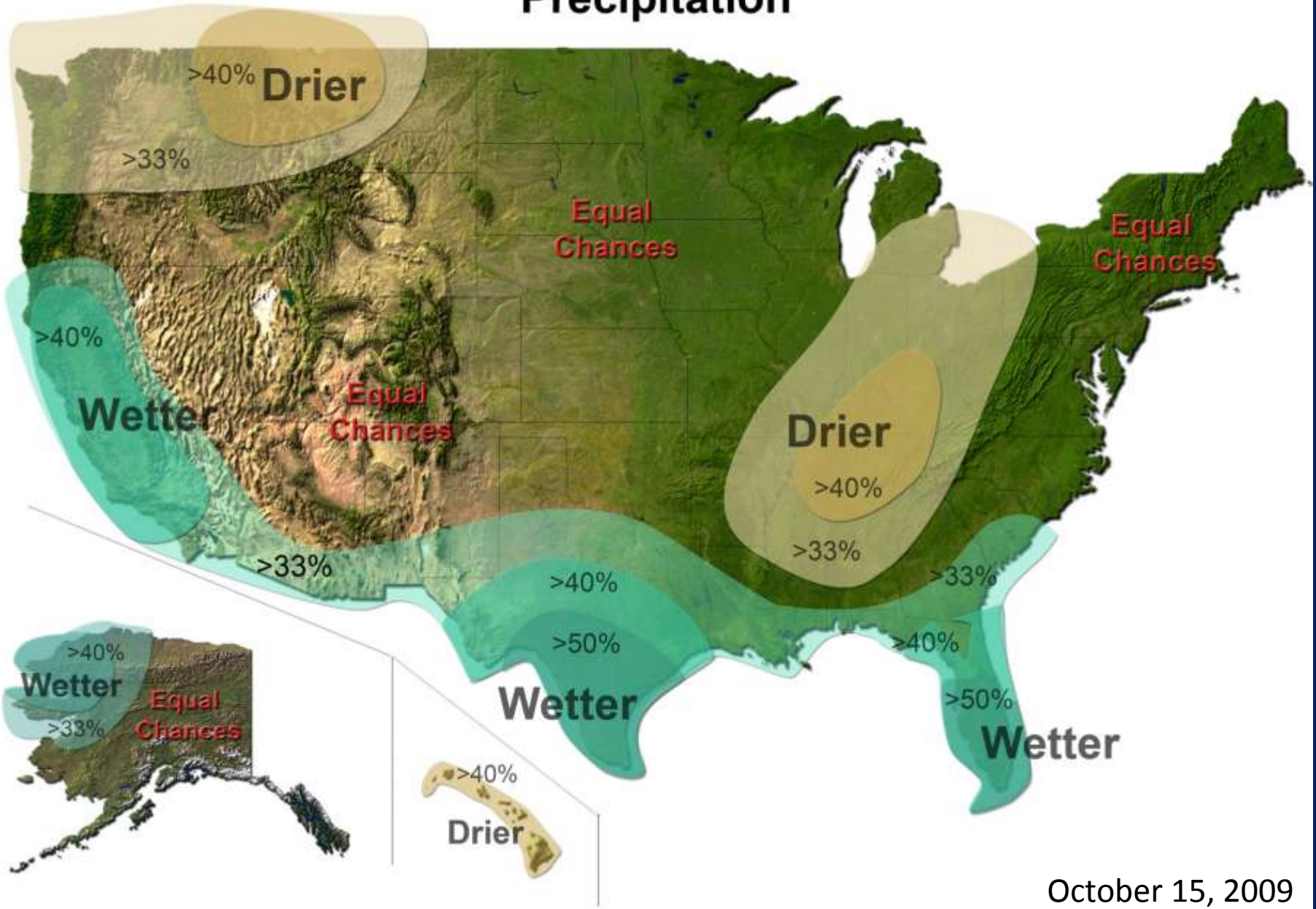
- A good start to the season would have troughs breaking down the 4-Corners High, this enables troughs to come in stronger earlier in the season.




B
33
40
EC
EC
EC
B
40
33
40
33
40
33
A
A
THREE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
3.5 MONTH LEAD
VALID JFM 2010
MADE 17 SEP 2009
EC MEANS EQUAL
CHANCES FOR A, N, B
A MEANS ABOVE
N MEANS NORMAL
B MEANS BELOW

U.S. Winter Outlook

Precipitation



October 15, 2009

Winter Outlook 2009-2010

- For the remainder of the fall an upper trough may develop north of Hawaii with a downstream ridge over the west coast.
- The impacts of El Niño will be felt across the region in December or January.
- The El Niño will be at least of moderate strength and persist into the spring.

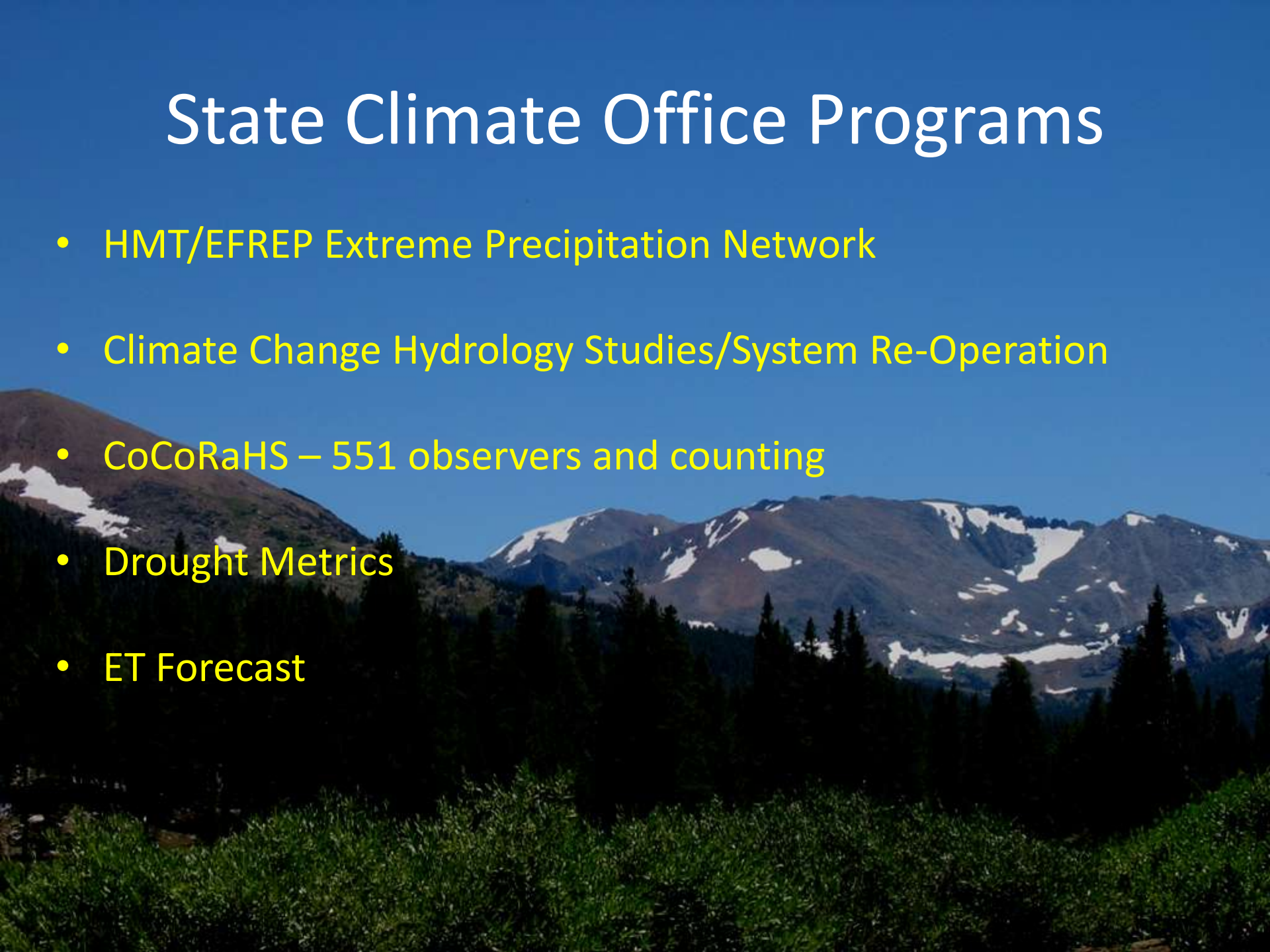
Winter Outlook 2009-2010

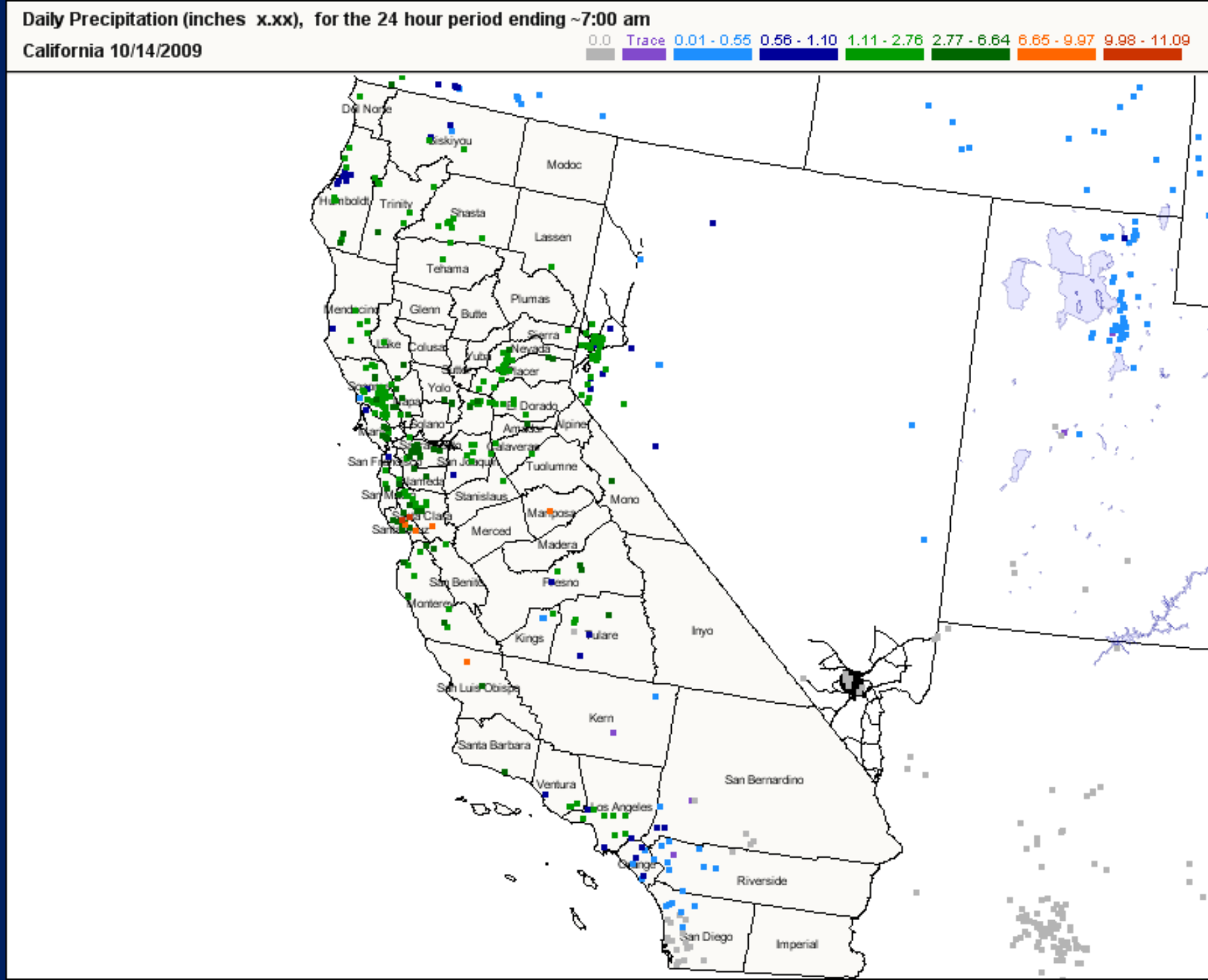
- For the Sierra there will be a better chance of an above normal snowpack the farther south you go. The northern Sierra will likely experience a near normal snowpack.

- The southern Cascades are likely to experience below normal precipitation this winter.

State Climate Office Programs

- HMT/EFREP Extreme Precipitation Network
- Climate Change Hydrology Studies/System Re-Operation
- CoCoRaHS – 551 observers and counting
- Drought Metrics
- ET Forecast



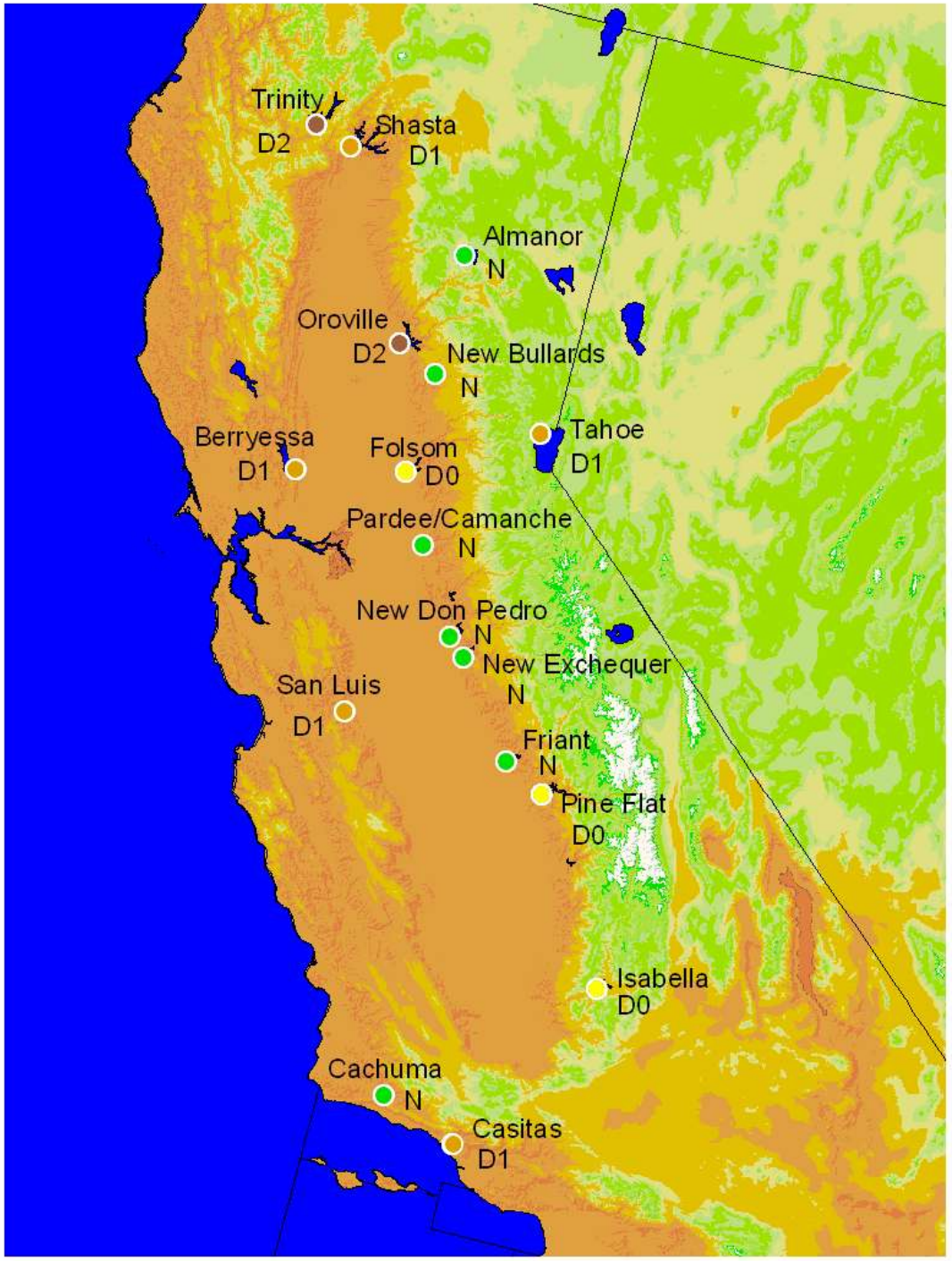

Daily Precipitation (inches x.xx), for the 24 hour period ending ~7:00 am
California 10/14/2009
0.0
Trace
0.01 - 0.55
0.56 - 1.10
1.11 - 2.76
2.77 - 6.64
6.65 - 9.97
9.98 - 11.09
Del Norte
Siskiyou
Modoc
Humboldt
Trinity
Shasta
Lassen
Tehama
Plumas
Mendocino
Glenn
Butte
Sierra
Lake
Colusa
Yuba
Nevada
Placer
Yolo
Napa
El Dorado
Solano
Alpine
Amador
Calaveras
San Francisco
San Joaquin
Tuolumne
Stanislaus
Mono
Santa Clara
Mariposa
Merced
Madera
San Benito
Fresno
Monterey
Kings
Tulare
Inyo
San Luis Obispo
Kern
Santa Barbara
Ventura
San Bernardino
Los Angeles
Orange
Riverside
San Diego
Imperial

New Drought Metrics

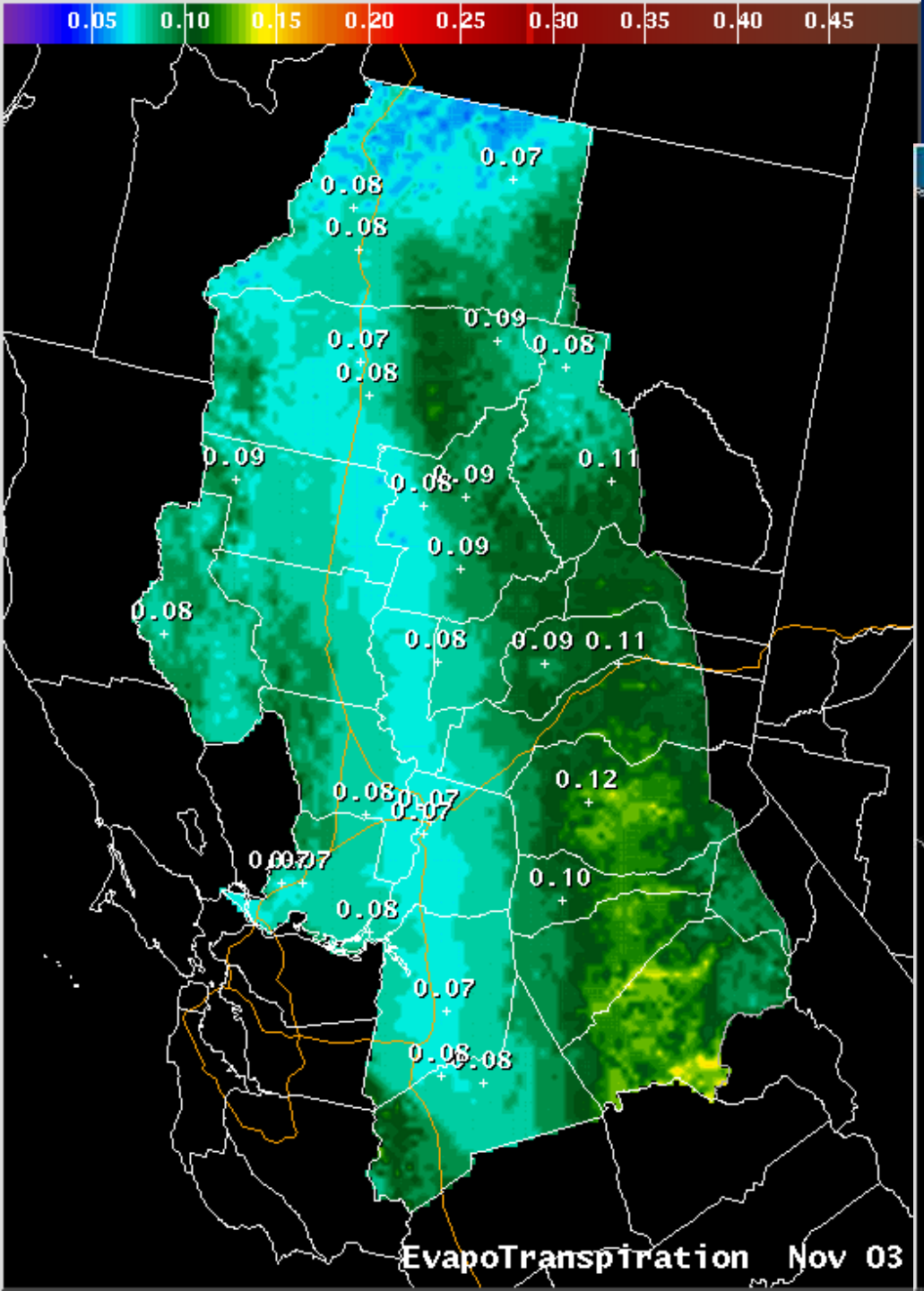
Categories	Frequency
N – Normal	+0.30
D0 – Abnormally Dry	0.20 - 0.30
D1 – Moderate Drought	0.10 - 0.20
D2 – Severe Drought	0.05 - 0.10
D3 – Extreme Drought	0.02 – 0.05
D4 – Exceptional Drought	0.00 – 0.02

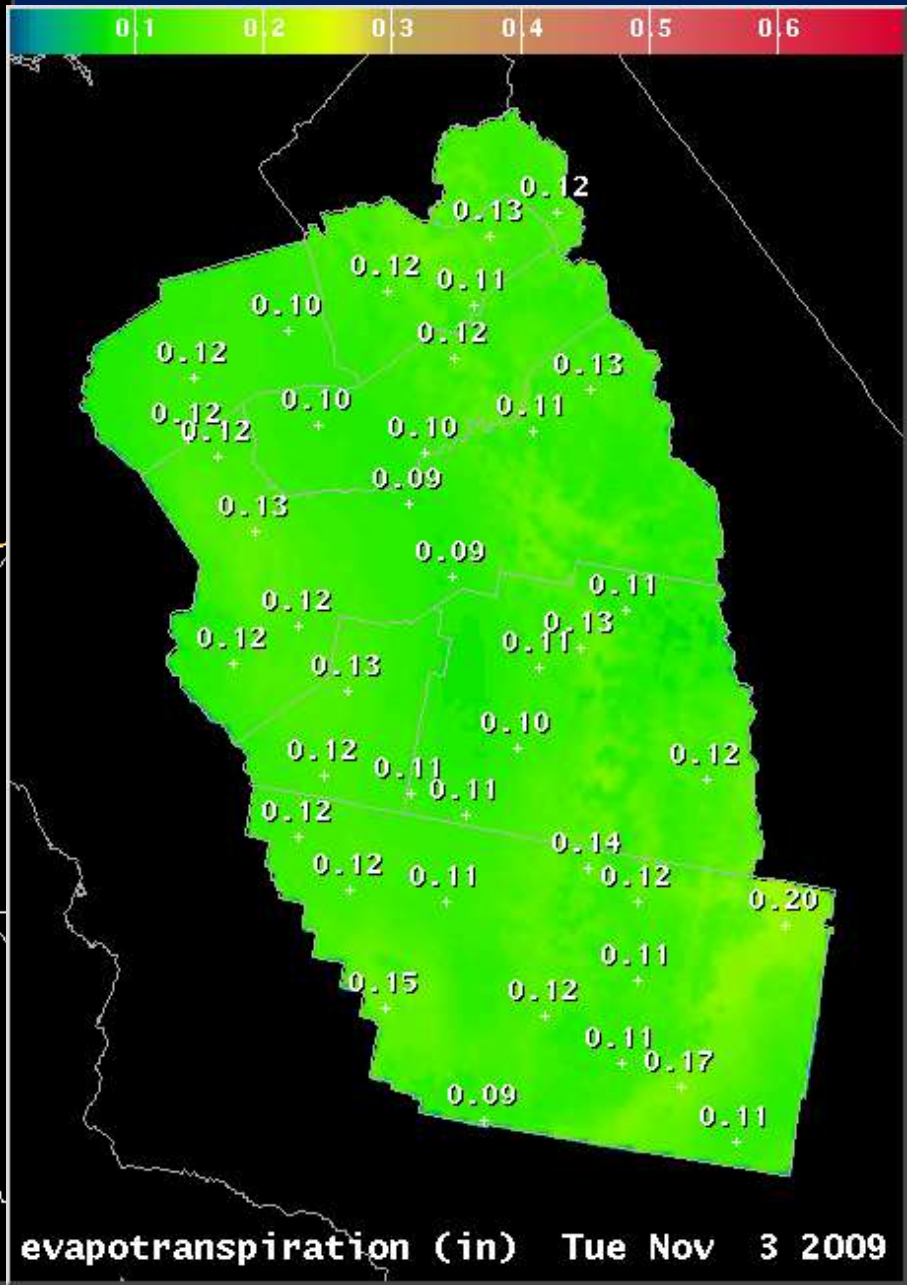
Similar product for
8 station index
and 5 station index

End of September 2009



ET Forecast


0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40 0.45
EvapoTranspiration Nov 03


0.1 0.2 0.3 0.4 0.5 0.6
evapotranspiration (in) Tue Nov 3 2009

Closing Thoughts

- Active time for all things climate
- As climate change accelerates, monitoring will become more important
- While the past may not be a good predictor in the future, there are still lessons to be learned from past observations


Questions?
manderso@water.ca.gov